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A COMPARISON OF CHILDREN'S KNOWLEDGE LEVELS ABOUT CARDIOVASCULAR FITNESS AND NUTRITION BEFORE AND AFTER A TEACHING MODULE

by

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Abstract

Many diseases, such as cardiovascular disease, are often the result of specific lifestyle behaviors or habits which can develop in childhood. Growing evidence suggests high levels of cardiovascular risk prevalence among school-aged children. Teaching strategies that are effective in seeking to promote health and well-being in children need to be developed and empirically evaluated. Therefore, the purpose of this study was to determine if there was a difference in pre and posttest knowledge levels about cardiovascular fitness and nutrition after a teaching module. Nola J. Pender's Health Promotion Model served as a guide for this research. The design used for this research was a pretest-posttest quasi-experimental design. A two-tailed dependent *t* test was utilized for data analysis. The hypothesis for this study was, there will be no difference in knowledge levels about cardiovascular fitness and nutrition for children before and after completing a teaching module. Levels of knowledge about cardiovascular fitness and nutrition were measured through the utilization of a quiz entitled "Here's Looking At You Kid" by the American Heart Association. A convenience sample of 55 sixth grade students was chosen from four elementary schools in Tuscaloosa County. Pretests

were given by the researcher to each of the four selected classes separately and a teaching module was then implemented. One month later, the pretests were repeated as posttests to check for retention of knowledge. The results demonstrated a statistically significant increase in knowledge levels between pretest and posttest, $t(54) = -4.76$, $p = .000$. These findings suggest that sixth graders are at an ideal age to learn and understand more about cardiovascular fitness and nutrition. Few research studies have been done to evaluate the effects of a teaching program about CV fitness, nutrition, and other health promoting behaviors on children. Further research is recommended to determine if similar findings will occur with replication of this study. Nurse practitioners should incorporate assessment of cardiovascular risk factors in the primary health care of children and their families. The findings from this study may make nurse practitioners more aware of the importance of cardiovascular assessment in children.

Dedication

Dedicated to my husband, Jeff and my son, Tony. Jeff, you are a wonderful husband and my best friend. Without your love and support this would not have been possible. Thank you for always being there and helping me see the light at the end of the tunnel. Tony, thank you for the hugs and your sweet smile that always brightens my day. I love you both very much.

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Thank you, God for answering my prayers. Without the many blessings you have given me, I would not have made it through this program.

I would again like to thank my husband and son. You have given up many things for me this year and I appreciate it. Thank you for putting up with me and loving me when it wasn't very easy to do.

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Chapter I

The Research Problem

Despite encouraging reductions in mortality rates from cardiovascular disease (CVD) during the past decade, heart disease constitutes a major health problem and remains the leading cause of death in the United States. A general consensus exists regarding the importance of lifestyle alterations in reducing the risk for chronic disease development. Behaviors associated with cardiovascular (CV) risk factors are potentially modifiable if people lose weight, reduce the fat, sugar and sodium in their diets, and begin regular exercise programs (Downey, Greenberg, Vergilio, & Berenson, 1989). Behavioral interventions should begin early in life, prior to the development of poor health habits. It is far easier to develop healthful habits than to change unhealthy behavioral patterns later in life (Howard et al., 1991).

Establishment of the Problem

During the last ten years, much research has focused on the study of CV risk factors for adults. However, less attention has been given to the study of these same risks in children. Acknowledged CV risk factors for adults, such as

obesity, positive family history, high serum cholesterol levels, high saturated fat intake, and sedentary lifestyle have been documented in some groups of children. Research supports that identification of CV risks during childhood may help to predict CV disease in adults (Carlisle et al., 1993).

Certain lifestyle behaviors or habits, such as overeating and lack of exercise, contribute to a person's coronary risk. Being overweight during infancy has been related to obesity in young adulthood. Infants who are overweight are at an increased risk of becoming overweight adults. Obesity appears to be an increasing problem in children as well as in adults (Butcher et al., 1988). Obesity is a nutrition related disease that contributes to CV disease. According to the latest published data from the Bogalusa Heart Study even moderate obesity is positively correlated with an unfavorable serum lipid profile in children. This correlation increases for the most part, as children grow into young adults (Wattigney, Harsha, & Srinivasan, 1991). Obesity, especially morbid obesity, is related to increased mortality in adults. In a cohort study of 750,000 men and women followed for 13 years, a 50% increase in total mortality was noted in individuals 30-40% above ideal weight. Actual data confirmed the detrimental impact of obesity on all-cause mortality. Obesity has also been linked to increased CVD mortality. Obesity is an

important public health problem regardless of the etiology of its effect on mortality (Burke et al., 1990). Obesity is important as a risk factor because of its association with increased cholesterol levels, triglycerides levels, glucose and insulin levels, hypertension, and HDL-C levels. Increased incidence of obesity also is associated with decreased activity levels. Programs to prevent obesity in children are highly recommended (Howard et al., 1991).

The Bogalusa Heart Study, an ongoing epidemiologic investigation of 8,000 children in the community of Bogalusa, Louisiana, compiled a large data bank on risk factors in children during the past 16 years. Observations show the precursors of heart disease begin at an early age with many youngsters already possessing one or more of the known clinical risk factors: hypertension, obesity, and adverse lipoprotein changes (Downey et al., 1989).

CV fitness that results from a regular program of exercise is a major factor in maintaining CV health (Howard et al., 1991). Children need to get adequate exercise in order to prevent chances of developing health problems later in life (Umansky, 1992). It seems the fitness craze of the 1980's, which motivated adults to pursue healthier lifestyles, did not influence today's children. Unfortunately, one of the greatest distinctions of children in the 1990's is their declining health and fitness levels. Contributing to the problem is television viewing habits.

According to Nielson Media Research, children ages 2 to 11 watch about 22 hours of television weekly (Marx, 1994). Children should be provided with opportunities for regular exercise, and it has been suggested that increased activity and fitness in childhood may enhance CV risk profiles (Sallis, Patterson, Buono, & Nader, 1988).

Since the identification of CV risk factors among children has been established as a means of predicting the onset of adult coronary heart disease, preventive efforts must start early (Downey et al., 1989). As socializing agents second only to the family, schools have a significant influence on the conditioning of lifestyle behaviors and habits that have a profound influence on health and well-being (Bartfay & Bartfay, 1994). Teaching strategies that are effective in seeking to promote health and well-being in children need to be developed and empirically evaluated. Therefore, the purpose of this study was to determine if there is a difference in children's knowledge levels about cardiovascular fitness and nutrition before and after a teaching module.

Significance to Nursing

Clinical practice. Although the literature demonstrates that CV risk factors exist in early childhood, little is known about promoting CV health in children. The findings from this study could help primary care providers such as the nurse practitioner to better promote CV health in

children. The nurse practitioner is in a unique position to detect children who are at risk for CV disease in adulthood and to implement family-oriented life-style modifications which promote CV health.

Because health promotion and disease prevention are a major aspect of nursing, the nurse practitioner must find new and creative ways to implement these concepts. The nurse practitioner is in the perfect position to help facilitate health education for children. Nurse practitioners should incorporate assessment of CV risk factors in the primary health care of young children and develop educational programs for not only children but also families. During the early years of childhood, individuals imitate and model health-related behaviors of family members. If the family practices health promoting behaviors, it is likely that the child will imitate them.

Education and prevention programs for CVD should start at the lowest educational level. Schools are an ideal place to reach children and educate them about health related issues. School nurses play an important part in promoting health and could benefit from the findings of this study. The school nurse is in an excellent position to assure continuity in accurate monitoring, referral, and follow-up (Carmon, Hauber, Howell, & Rice, 1990).

Education. Health promotion and disease prevention are salient topics in the United States today. Nurses must be

made aware, through education, of their role in these two important areas. CVD is a major health problem and is the leading cause of death in this country. More emphasis should be applied to the education of our children about CVD and risk factors. This study could provide a framework for teaching CV risks to elementary children.

Research. There is a need for continued research that includes larger samples from more diverse populations as well as longitudinal studies. The dietary intake and physical activities of young children at home, at day care, and in schools need to be studied further. Obesity is a major problem in children and adults. The relationship of obesity to other risk factors in childhood and later life is an area for further study. Continuation of research studies on teaching programs remains important. The nurse practitioner is well suited to continue the research in the area of health promotion and CVD. This research would add much needed knowledge to the body of nursing. It also could provide a framework for replication in other settings.

Conceptual/Theoretical Framework

Nola J. Pender's Health Promotion Model (HPM) was utilized for this study. The HPM is derived from the social cognitive processes in the changing of behavior (Pender, 1990). The HPM extends the Health Belief Model to include determinants of health-promoting behavior. "Health-promoting behavior is directed toward maintaining or improving an

individual's level of well-being, personal fulfillment, and self-actualization and away from reacting to a threat of illness" (Fleury, 1992, p. 232). There are three components in the HPM that are primary predictors of health promotion behavior. These components as stated by Fleury are "(1) cognitive/perceptual elements that determine participation in health-promoting behaviors, (2) modifying circumstances that influence the cognitive-perceptual factors and thus indirectly influence health promoting behaviors, and (3) the likelihood of action directed toward enhancing or maintaining well-being" (1992, p. 232).

In 1992 Fleury found that the HPM had been used to explain and predict patterns of health promoting lifestyle activities including exercise and nutrition. In the past ten years, primary prevention and health promotion have become salient topics in society and in nursing (Bartfay & Bartfay, 1994). With increasing emphasis on health promotion and illness prevention, individuals and families are encouraged to assume personal responsibility for their own health. As a result, there is a need to understand what determines health behaviors. This will lead to effective nursing actions to promote competence of clients in self-care. The HPM is ideal for this study. The model is easy to understand and the language is clear. The HPM was designed to help understand how clients can be motivated to attain personal health (Mariner-Tomey, 1994). This is important in dealing with

children. Children must also be motivated. Because childhood is the ideal time to learn positive health practices, the nurse practitioner must learn more new and exciting ways to educate children about health promotion. The HPM's primary motivational mechanisms for the activities related to health promotion could help the nurse practitioner. For example, knowing the child's definition of health, the perceived benefits of behaviors and the perceived barriers to health promoting behaviors may provide the nurse practitioner with valuable information about the best way to educate this child. The HPM can help the nurse practitioner develop the knowledge needed to assist children in initiating and sustaining behaviors congruent with risk reduction efforts.

Assumptions

The basic assumptions of this study were as follows:

1. CV risk factors such as obesity and lack of physical activity are often prevalent during childhood.
2. CV risk factors may be modified by lifestyle changes such as adequate exercise and proper diet.
3. Children can learn about risk factors and important lifestyle changes.
4. Levels of knowledge about exercise and diet in children can be measured.

Purpose of the Study

Teaching strategies that are effective in seeking to promote health and well-being in children need to be developed and empirically evaluated. Therefore, the purpose of this study was to determine if there was a difference in pre and posttest knowledge levels about cardiovascular fitness and nutrition for children after completing a teaching module. The goal of this study was to educate sixth-graders about cardiovascular fitness and nutrition and to promote healthier lifestyles.

Statement of the Problem

Many diseases, such as cardiovascular disease, are often the result of specific lifestyle behaviors or habits which can develop during childhood. Growing evidence suggests high levels of cardiovascular risk prevalence among school-aged children. Behavioral interventions for CVD should begin early in life, before the development of poor health habits. It is much easier to develop healthful habits than to change unhealthy behavioral patterns later in life. Educational programs for children involving health promotion need to be developed. Therefore, the problem explored was the effects of a teaching module on children's knowledge levels about cardiovascular fitness and nutrition.

Hypothesis

One hypothesis was tested by this research: There will be no difference in knowledge levels about cardiovascular fitness and nutrition for children before and after completing a teaching module.

Definition of Terms

For this research study the following terms were defined:

1. Children--Theoretical: Plural of child, which is a person from the time of birth to the stage of physical maturity; a young boy or girl. Operational: Sixth grade students ages 11 - 13 who were willing to participate in the study and were class members of the four elementary schools chosen for this study.

2. Knowledge levels--Theoretical: The amount of understanding and familiarity gained by actual exposure to information. Operational: In this study knowledge levels about CV fitness and nutrition were measured specifically by scores on the American Heart Association's "Here's Looking at You Kid" (see Appendix A).

3. Cardiovascular Fitness--Theoretical: Attaining a more efficient heart that does not have to work as hard to pump blood throughout the body. Operational: CV fitness was taught through the use of the American Heart Association's teaching module.

4. Nutrition--Theoretical: A balanced diet made up of six key elements working together to provide the body with all the nutrients needed. These elements include protein, carbohydrates, fats, vitamins, minerals, and water. Operational: Information about nutrition was given to the students through utilization of handouts and a video by the American Heart Association.

Summary

Heart disease constitutes a major health problem and remains the leading cause of death in the United States. Growing evidence suggests high levels of CV risk prevalence among school-aged children. Some of these risk factors include being overweight and having inadequate amounts of exercise. Teaching strategies that are effective in seeking to promote health and well-being in children need to be developed and evaluated. The purpose of this study was to determine if there was a difference in pre and posttest knowledge levels about CV fitness and nutrition and to promote healthier lifestyles. Nola J. Pender's HPM guided the study. The American Heart Association's "Here's Looking at You, Kid" quiz was used to measure knowledge levels before and after implementation of a teaching module.

Chapter II

Review of the Literature

In today's society Cardiovascular Disease (CVD) is found in adults as well as in children. A review of the literature revealed many studies on CVD and adults, but relatively few on children. The following research was found which addressed children and heart disease specifically. The studies relate to children and CV risk factors, interventions utilized to reduce risks, and health promotion among this age group.

One study which related to promoting health in schools through a board game was conducted by Bartfay and Bartfay (1994). A pretest-posttest experimental design was utilized for this research. The setting was a sixth grade class in an elementary school in Winnipeg, Manitoba. The students were randomly assigned into either control or experimental groups by drawing red or blue tokens from a concealed bag. The pretest was given to all students. The experimental group played the lifestyle board game twice, two weeks apart, for 60 minutes. The game was designed by the investigators to convey information to children related to basic anatomy and physiology of the human body, diet and nutrition, as well as lifestyle risk factors associated with heart disease and

cancer. The reading level and wording of both the test instrument and the game cards were verified by two elementary school teachers. Twenty-three students participated in the study.

The investigators hypothesized that students who play the lifestyle game would have higher levels of knowledge, as measured by the 30-item paper-and-pencil test, than students who did not play the board game. The experimental group had a mean gain score of 14.5 correct items on the posttest, and the control group had a mean gain score of 4 correct items. Data were analyzed utilizing a t test. The gain scores were found to be statistically significant. The difference between pretest and posttest scores for the three sections were found to be statistically significant for the experimental group ($p < .05$), but not for the control group. Bartfay and Bartfay (1994) concluded that board games may be used to increase knowledge about lifestyle risk factors associated with the development of heart disease and cancer, anatomy and physiology, and diet and nutrition in the school aged population. Longitudinal research involving larger numbers of children with different age groups was recommended as was employing qualitative methods to evaluate the player's perspective on the educational value of health games. The current study did not use a control group, but a pre-post experimental design was utilized.

A study that was conducted in 1992 by Cowell, Montgomery, and Talashek related to CV risks in children from grade school through high school age. The purpose of this longitudinal study was to investigate changes in cardiovascular risk for a self-selected sample of high school students who had been screened as part of a cardiovascular risk reduction program during the sixth grade. The following research questions were utilized to guide the study: (a) Are CV risk factors within children stable over time? (b) Do significant changes occur in the proportion of children who are at risk for CVD from grade six to high school? and (c) Do gender differences exist in risk for previously screened male or female students? A conceptual framework was not stated in the article. The study was conducted in a Chicago suburban high school which drew students from four middle schools. These students had a CV risk reduction screening that was completed in the sixth grade. The sample consisted of 195 students. The measures selected for the study were those used in the original screening in which all of the students had participated. Weight, height, blood pressure, cholesterol levels and CV fitness were measured. Cowell et al. (1992) found significant overall decreases in risk level for obesity and heart rate recovery. Prevalence rates of risk factors were above 5 per 100 for all factors except cholesterol, which was 4.06 per 100. A clear gender effect existed in terms of

relative risk for high cholesterol. Univariate distributions, chi-square and cross tabulations were utilized to analyze the data. Females who were at risk in grade school were much more likely to be at risk in high school than males who were at risk. No gender differences were found in relative risk for obesity. An age effect also existed for relative risk. Generally, younger high school students who were at risk in grade school were more likely to be at risk in high school for high cholesterol. Cowell et al. (1992) found significant overall decreases in risk level for cholesterol and blood pressure and insignificant increases in risk level for obesity and heart rate recovery.

Recommendations for future research were made as well as recommendations for nursing practice. Four nursing intervention needs were identified by the study. The authors suggested that reinforcement of a cognitive program could be carried out annually for students, the school, and families through school newsletters, a fitness week, health fairs, and other community-based efforts. Cowell et al. (1992) also discussed the benefits and desirability of starting CV risk reduction early, in the elementary school years to prevent the establishment of hard-to-change health behaviors. The risk reduction program in the Cowell et al. (1992) study was implemented to the same age group as that in the current study. However, the current study is not cross sectional and

did not include the measurements of weight, height, cholesterol, and blood pressure.

Carlisle et al. (1993) conducted a pilot study that described CV risk factors of young children, caregivers' awareness of CV risk factors, and caregivers' knowledge of CV health promotion activities for children. The following research questions were identified for the study: (a) What is the caregivers' awareness of acknowledged CV risk factors in their 2- and 3-year-old children? (b) What is the occurrence and pattern of CV risk factors in 2- and 3-year-old children? and (c) What is the knowledge of caregivers regarding self-care activities which promote CV health?

Orem's concept of self-care was linked to Pender's HPM to provide the structure for this study. The investigation was a descriptive field study utilizing survey techniques. The population was derived from all 2- and 3-year-old children enrolled in a selected day-care system in a southeastern metropolitan area. A convenience sample of 51 child-caregiver dyads were identified. Data collection occurred in seven day-care centers attended by the subjects. The subjects' vital signs, height, weight, skinfold thickness, and serum cholesterol levels were obtained. The caregiver completed a subject information form, a 24-hour diet recall, and a knowledge assessment instrument. Two investigator-developed instruments were utilized in the study. The Risk Factor Self-Care Assessment Instrument

assessed caregivers' knowledge about CV risk factors in children and the self-care activities conducted by the caregiver in facilitating CV health for the child. Test-retest methods were used to establish the reliability of the instrument, alpha = .469, $t(5) = -2.00$, $p = .102$. Content validity was established by a review panel of eight experts in child health, CV health, and research. A Kuder-Richardson Formula 20 correlation coefficient for internal consistency was calculated at .78 for the knowledge scores in this sample. The second instrument utilized was a diet assessment form which included both a 24-hour diet recall for a typical day and an intake pattern for a typical week. Chi-square analysis and content analysis were used to answer the research questions and the Nutritionist III computer software program was used to analyze the 24-hour diet recall data.

Findings revealed that of the 51 predominantly white, middle-class child-caregiver dyads, approximately half of the children studied were boys and half were girls. The mean age was 31.6 months (range = 22 to 42 months). The mean height for the group was 36.9 inches and the mean weight was 32.5 lb. The mean skinfold percentile for the group was 52 which was normal for the age. The mean systolic blood pressure was 94.8 mmHg with range of 74 to 135 mmHg. The mean total cholesterol level was 158 mg/dl with a range of 106 to 228 mg/dl. The mean High Density Level (HDL) was 42.5

mg/dl with a range of 9 to 67 mg/dl. A total of 15 children were referred for medical follow-up due to an increased cholesterol (> 170 mg/dl) or low HDL (< 29 mg/dl). To assess knowledge of CV risk factors, parents were first asked to complete a test on CV risk factors in adults. Eighty percent or more of the caregivers recognized the following CV risk factors: smoking, obesity, elevated blood pressure, family history of heart disease, high fat in the diet, high blood cholesterol, and stress. Few caregivers recognized use of alcohol, birth control pills, and lack of exercise as CV risk factors. Each parent was asked to identify risk factors currently present in the child's lifestyle. Parents identified risk areas of diet (58%), heredity (21%), lack of exercise (11%), obesity (5%), and parental smoking (5%).

Parents were asked to identify self-care activities they currently initiated to help their children have healthy hearts. Manipulation of diet and promotion of exercise were identified as areas of intervention by 75% of the sample. Parents identified a need for educational efforts, improved diet and exercise. The mean 24-hour caloric intake was less than the recommended daily allowance for age and the percentage of calories derived from fats was slightly above recommendations.

The researchers concluded that this study supported the need for comprehensive CV risk screening of young children and education of their families. Recommendations were made

to study the dietary intake and physical activities of young children. The authors recommended that nurses incorporate assessment of CV risk factors in the primary health care of young children and develop educational programs for families. This recommendation supports the current study which sought to develop an educational program for young children and to further test Pender's HPM.

Another study which was found in the review of the literature addressed adolescents enrolled in health classes in two high schools in rural, central Maine (White & Klimis-Tavantzis, 1992). This research was initiated to help the adolescents lower their risk for CVD. Participating adolescents assessed their risk for CVD which included food intake, fasting blood lipids, heights, weights, percent body fat, and cardiovascular nutrition knowledge. Assessments were made prior to and following intervention, as well as during periodic follow-ups.

Three instruments, a three-day food record, self-perceived food practices, and cardiovascular knowledge instruments, and a demographic/family history information form were used in the study. Two class periods on consecutive days were used to complete written assessments and receive instructions for recording food intake. Trained nutritionists conducted assessments.

Adolescents kept three-day food record forms on two weekdays and one weekend day. A food practices instrument

composed of 12 items, designed and tested by White and Klimis-Tavantzis (1992), was administered. Statements assessed adolescents' perceptions of their daily meal patterns and adherence to the Dietary Guidelines. A Likert-type scale with five continuum points ranging from "always true" to "never true" was used. A 30 item CV knowledge instrument, taking 15-20 minutes to complete, also was administered. The test was designed as multiple choice questions compiled from existing tests. Sixty percent of the items related to knowledge of heart-healthy food practices, and 40% related to knowledge of CV disease. Demographic and family history information was elicited from both adolescents and parents/guardians. Items included education of parents/guardians, family structure such as size and gender composition, and family history of CV risk factors such as obesity, diabetes, and heart disease.

Food records were coded and analyzed using the Nutritionist III microcomputer program. Nutrient analyses and written questionnaires were coded using the Data Entry II microcomputer software program created by SPSS, Inc. Analyses were conducted with the [SPSS. sup. x] mainframe computer program. Statistical analysis consisted of descriptive statistics, and $\underline{t}$ tests for testing significant differences between means were used to study bivariate relationships. Selected dietary components related to heart health were analyzed: energy, percent kilocalories from fat,

total fat, saturated fat, cholesterol, dietary fiber, and sodium. For each student mean daily intakes were calculated as nutrient total and as nutrients per 1,000 kcal, as measures of diet quality and as a means of comparing subgroups whose energy intakes differ. Mean dietary component intakes were compared to recognized dietary standards.

Findings revealed that the mean percent of kilocalories from fat was 36% for both males and females. Compared to the American Heart Association guidelines, 80% males and 73% females had more than 30% kilocalories from fat; 37% males and 16% females had dietary cholesterol intakes above 300 milligrams. More than 50% of males but less than 25% of females had sodium intake greater than 3,000 milligrams. Slightly more than 64% of the sample reported they always or almost always ate breakfast, while 70.6% said they ate lunch. Additionally 43.6% females and 22.5% males perceived themselves as limiting fat intake. However, more males (50%) than females (35%) said they used low fat milk and slightly more males (45%) than females (40%) perceived themselves as limiting salt. Approximately 22% of both males and females reported eating more fish and/or chicken than red meat on a weekly basis. Total scores for both males (47%) and females (53%) were low on the Cardiovascular Nutrition Knowledge Test. Females scored significantly higher than males. Cronbach's Alpha coefficient (internal consistency) for the

knowledge items was 0.68. Assessment of the test indicated that these adolescents knew little about the process of cardiovascular disease and issues involving fat intake and heart disease.

White and Klimis-Tavantzis (1992) concluded that emphasis on the importance of appropriate educational curricula offered within the school system from kindergarten through 12th grade should be stressed. White and Klimis-Tavantzis's study (1992) was similar to this current study in methodology and focus as both examined knowledge of students concerning cardiovascular nutrition using a pretest-posttest design.

Howard et al. (1991) conducted a descriptive study to identify differences in children's physical measurements with regard to six CV risk factors. A descriptive design using three questionnaires and physical measurements was used. The questionnaires included the Bloomsday Cardiovascular Fitness Questionnaire, the Coronary Risk Profile, and the Diet Habit Survey. Physical measurements included blood pressure readings, weight, total serum cholesterol, and high-density lipoprotein levels. A convenience sample of 78 children between the ages of 7 and 18 years ($\underline{M}$ = 13.3, $\underline{SD}$ = 2.79) participated. Fifty males (64.1%) and 28 females (35.9%) took part in the study. When asked to rate their overall health, 50 (64.1%) subjects stated they were in excellent health; 24 (30.8%) ranked

themselves as being in good health; and 4 (3.1%) subjects indicated fair health. All (100%) subjects' parents reported that their child was nondiabetic, normotensive, and had normal electrocardiograms. This study was unique because it was conducted on a group of children who actively participated in an annual community aerobic activity, the Bloomsday Run. Bloomsday Cardiovascular Fitness Questionnaires were distributed to previous Bloomsday participants. All of the 78 children who returned the initial form were invited to continue in the study. The two subsequent questionnaires were completed and physical measurements were done by trained personnel.

Data were analyzed using descriptive statistics to describe the physical measurements of the sample. An alpha level of .05 was chosen as the level of significance. Multiple one-way analyses of variances (ANOVAs) were used to determine if differences existed among the four physical measurements for each part of the diet. Five areas of the diet were found to be significant with various physical measurements. Post hoc comparison tests were then conducted to determine differences among the various types of diets and the physical measurements for each of the five significant ANOVAs. Subjects who ate a typical American diet of meat had significantly lower weight percentiles than those who were in Phase II, $t(43) = 1.99$, $p = .03$. Subjects who ate a typical American diet of fat had significantly

higher HDL-C percentiles than those in Phases I, $t(41) = 3.53$, $p = .001$; II, $t(35) = 3.48$, $p = .001$; or III, $t(13) = 2.94$, $p = .001$. Subjects who ate a typical American diet of sweets had significantly higher HDL-C percentiles than those subjects who were in Phases II, $t(56) = 2.17$, $p = .02$; or III, $t(21) = 3.45$, $p = .001$.

Mann-Whitney U statistics were run to examine differences between physical measurements of subjects who had blood pressure readings below the 90th percentile and those subjects who had blood pressure readings at or above the 90th percentile. Subjects with systolic readings below the 90th percentile had specifically higher height percentiles than subjects with readings above the 90th percentile, $U(75) = 286.00$, $p = .04$. Subjects with diastolic readings below the 90th percentile had significantly lower systolic reading percentiles than subjects with diastolic readings above the 90th percentile, $U(75) = 584.00$, $p = .01$.

To compare differences on physical measurements, t tests were run with subjects who had at least one parent who smoked ($n = 36$, 46.1%) and subjects who did not have parents who smoked ($n = 37$, 57.4%). Subjects whose parents did not smoke had significantly lower systolic blood pressure percentiles than subjects with parents who smoked, $t(71) = 1.87$, $p = .03$. Chi-square tests were conducted and did not demonstrate any significant differences in physical measurements among subjects with a family history of heart

disease compared with those subjects who did not have a family history of heart disease.

Multiple Pearson product moment correlations were run to determine the relationship between amount and frequency of exercise and physical measurements. One correlation was significant. Children who ran or walked for more years had higher HDL-C percentiles, $r = .26$, $p = .03$. Children who ran or walked for more years were older, $r = .41$, $p = .000$. Thus, the older children's percentiles may have been greater than the other children's due to their age. However, age and HDL-C percentile did not significantly correlate, $r = .20$, $p = .09$.

Multiple one-way ANOVAs were used to determine if differences existed between the four physical measurements and each of the five behaviors or personality characteristics. Three significant differences were found Post hoc comparison tests were then conducted to determine differences among the degree of behavior reported and the physical measurements for each of the three significant ANOVAs. Subjects who expressed no need to excel had significantly higher weight percentiles than those who reported somewhat of a need to excel, $t(19) = 1.79$, $p = .04$; a fair need to excel, $t(30) = 2.64$, $p = .01$; or a great need to excel, $t(28) = 3.04$, $p = .001$. Subjects who were not competitive had significantly higher weight percentiles than those subjects who were somewhat competitive, $t(31) = 1.73$,

p = .05; or who were very competitive, $t(28) = 2.75$, p = .001. Subjects who were fairly competitive also had significantly higher weight percentiles than those who were very competitive, $t(40) = 2.36$, p = .01. Subjects who were not pressed for time had significantly higher weight percentiles than those who were somewhat pressed for time, $t(52) = 2.39$, p = .01; were fairly pressed for time, $t(28)$ = 1.82, p = .04; or were very pressed for time, $t(23) = 2.91$, p = .001.

Howard et al. (1991) concluded that multiple factors need to be considered when assessing children for CV risk factors. The authors recommended that the child and family, as well as the educational system, be involved in interventions directed toward risk reduction. This study was similar to the current study in that they both were concerned about children and their CV risk factors. Howard et al.'s (1991) study was different in that physical measurements were utilized, and an intervention was not implemented. Additionally, the age of the participants differed in that the sample consisted of children ages 7 to 18, whereas the current study only involved children ages 11, 12 and 13.

A study by Sallis et al. (1988) was designed to investigate the relations between physical activity, CV fitness, and CVD risk factors in children and adults. Families of fifth and sixth grade Mexican American and non-

Hispanic White children were recruited from 12 low-to-middle income San Diego elementary schools to participate in a health promotion study. Families were excluded from the study if there was evidence of preexisting CVD. Two-hundred and six families were measured at baseline. All analyses were conducted on the combined group. Assessments were conducted at elementary schools by trained, certified and supervised assessors. All measures were collected between 7:30 a.m. and 11:30 a.m. in the fasting state. Blood pressure and blood drawing were completed before the submaximal exercise test. Questionnaires were available in Spanish, and bilingual staff were available to administer the physical activity recall interviews. The seven day physical recall was used in this study. Subjects reported time spent in sleep and in moderate, hard, and very hard intensity activities, and an index of total energy expenditure can be derived, expressed as kilocalories per kilogram per day.

A cycle ergometer submaximal graded exercise test was used to assess CV fitness. A medical screening questionnaire was used to exclude anyone with contraindications. The modified Astrand-Rhyming protocol of gradually increasing workloads was chosen based upon a previous study. The test was terminated when adults reached 70% of predicted maximal heart rate, when children reached 85% of maximum, or when a perceived exertion criterion was reached. Predicted maximal

oxygen consumption was calculated based on heart rate during the final workload (four-minute steady state).

A 12-hour fasting 10 cc blood sample was obtained from all consenting subjects. Lipid Research Clinic protocols were used to determine triglycerides, total cholesterol, and HDL cholesterol levels while low density lipoprotein cholesterol was determined by calculation.

Data were analyzed with the SPSS-X statistical package. Pearson correlation and partial correlation procedures were used. All correlations between CV fitness and risk factors in adults were moderately strong and significant. All correlations indicated lower risk among more fit individuals. Since body mass index was highly correlated with predicted maximal oxygen consumption, there was a question regarding the extent to which body mass mediated the fitness-risk factor relation. Using partial correlation, the fitness-risk factor associations were reanalyzed adjusting for body mass. The relations with heart rate remained strong in all subgroups, but the correlations between fitness and HDL cholesterol and between fitness and the HDL/LDL ratio became nonsignificant. The association between fitness and blood pressure remained significant for female adults, but not for male adults. For male adults, energy expenditure did not correlate with any risk factors, but for female adults, energy expenditure was significantly correlated with body mass index and the HDL/LDL ratio in the

predicted directions. The simple rating of physical activity was correlated with resting heart rate and body mass index in male adults, and with heart rate, body mass index, and HDL/LDL in female adults. Although the activity rating was not correlated significantly with energy expenditure, it was significantly associated with predicted maximal oxygen consumption in both male and female adults. The pattern of results in children was similar to that found in adults. For both female and male children, fitness was significantly correlated with all risk factors (except HDL/LDL in males). The partial correlations, after adjustment for body mass index, revealed that predicted maximal oxygen consumption and heart rate correlated in both sexes. Fitness and diastolic blood pressure were correlated in male children, but none of the other partial correlations was significant. Again, energy expenditure was correlated with none of the risk factors in male children and only HDL/LDL in female children. The activity rating was significantly correlated with heart rate and body mass index in male children, and diastolic blood pressure, heart rate, and HDL/LDL in female children. In children, the activity rating was not correlated with either energy expenditure or predicted maximal oxygen consumption.

Sallis et al. (1988) found that CV fitness was consistently correlated with CVD risk factors, such as blood pressure, lipid levels, and body mass index, while measures

of physical activity were weakly correlated with risk factors. However, fitness-risk factor and activity-risk factor correlations tended to be higher in female subjects. These findings also indicated that relations among measures of CV fitness, physical activity, and CVD risk factors were similar for children and adults in the sample of families. Sallis et al. (1988) recommend that children be provided with opportunities for regular exercise and suggest that increased activity and fitness in childhood may enhance CV profiles.

One of the most well known studies about CVD and children was conducted by Lauer, Connor, Leaverton, Reiter, and Clarke (1975). The purpose of the investigation was to determine the distribution of the serum cholesterol and triglyceride levels, the blood pressure, and excess body weight in a school-age population. Values established as predictive of the development of coronary heart disease in adults were utilized to compare the magnitude of these disorders in children and their relative importance.

The subjects for the study were school children of Muscatine, Iowa. Approximately 70% of the school population, 4,829 students returned signed parental consent forms to participate in the study. The children were in grades 1-12, ages 6-18. There were 2,483 girls and 2,346 boys. In the school population 0.6% were Black, 0.1% were American

Indian, 0.1% were Oriental, 2.8% were Spanish-American, and the majority (96.4%) were White.

All examinations were carried out during the school year of 1971-72 and 1972-73, over a 14-month period of time. On the morning of the exam, each student had venous blood drawn. A dietary history was taken for the breakfast meal in 962 children. Each item of food was recorded and its fat content estimated from standard food tables. The blood was analyzed in duplicate for serum cholesterol and triglyceride content by a standard Auto Analyzer technique. On the afternoon of the same day, the blood pressure, height, body weight, and triceps skinfold thickness were measured. Blood pressures were obtained in both arms and the average of the two readings were used for analyses. The fourth Korotkoff sounds were used for estimation of diastolic blood pressure. The standard height was measured with subjects in stocking feet using an anthropometric plane. Body weight was measured with subjects clothed and without shoes on a beam-type balance scale calibrated with standard weights. Triceps skinfold thickness was taken at the measured midpoint between the acromion and the tip of the elbow over the triceps muscle of the left arm, utilizing a Lange skinfold caliper. The skinfold was measured three times and a mean of the three readings was used for analyses. All measurements with student identifying data including birth date, sex,

date, and school were recorded on protocol sheets and then transferred to IBM cards.

Findings indicated that serum cholesterol levels were similar for children at all ages. The mean serum cholesterol level was 182 mg/dl (SD + or - 29). Twenty-four percent of the participants had levels greater than or equal to 200 mg/dl; 9% were greater than or equal to 220 mg/dl; 3% were greater than or equal to 249 mg/dl; and 1% were greater than or equal to 260 mg/dl. Casual levels of serum triglyceride increased with age. The mean level was 71 mg/dl (SD + or - 36) at age 6 years and 108 mg/dl (SD + or - 45) at 18 years. Only 15% of the children had triglyceride levels of 140 mg/dl or more. Blood pressure increased strikingly with age. No child between 6 and 9 years of age had blood pressures greater than or equal to 140 mmHg systolic or greater than or equal to 90 mmHg diastolic. In the age group 14 to 18 years, 8.9% had systolic blood pressures greater than or equal to 140 mmHg, 12.2% had diastolic blood pressures greater than or equal to 90 mmHg, and in 4.4% both pressures were at or above these levels. Obesity also increased through the school years. At age 6 to 9 years, 20% had weights relative to those of the group as a whole of greater than or equal to 110%, and 5% were greater than or equal to 130%. In the 14 to 18 years age group, 25% had relative weights of greater than or equal to 110%, and 8% were greater than or equal to 130%.

The observations in this large school-age population revealed a considerable number of children, particularly adolescents, having levels of serum lipids, blood pressures, and relative body weights which are known to relate to the early development of coronary artery disease in adults. Lauer et al. (1975) suggested that the identification of such children, in addition to the benefits for themselves, may also allow the discovery of other family members with coronary risks because of the known clustering of hyperlipidemia, hypertension, and obesity within family members.

Summary

A review of the literature revealed that CV risk factors are often prevalent in young children. A need for primary prevention and health promotion efforts directed at school-aged populations was also recommended by the researchers. The presence of obesity and the lack of regular physical activity as CV risk factors in children were noted in all studies reviewed. This review of literature provided positive reinforcement for the current study in which levels of knowledge about CV fitness and nutrition were examined.

Chapter III

The Method

Many diseases, such as cardiovascular disease, are often the result of specific lifestyle behaviors or habits which can develop in childhood. Growing evidence suggests high levels of cardiovascular risk prevalence among school-aged children. Some of these risk factors include being overweight and having inadequate amounts of exercise. Teaching strategies that are effective in seeking to promote health and well-being in children need to be developed and empirically evaluated. Therefore, the purpose of this study was to determine if there was a difference in children's knowledge levels about cardiovascular fitness and nutrition before and after a teaching module.

Design of the Study

A pretest-posttest quasi experimental design was used for this study. A pretest-posttest design is an experimental design in which data are collected from research subjects before and after the introduction of the intervention (Polit & Hungler, 1991). A quasi experimental design as defined by Polit and Hungler (1991) is a study which lacks randomization of subjects or a control group; however,

manipulation of the independent variable by the researcher does occur. Even though a true cause-and-effect relationship cannot be established, the researcher does exercise some control to ensure that the intervention is truly responsible for the results rather than uncontrolled factors.

Variables

Dependent. The dependent variable was the actual knowledge gained by the subjects as determined by the posttest scores.

Independent. The independent variable was the teaching module that was used to instruct the students about CV fitness and nutrition.

Controlled. The controlled variables for this study were identified as the matched school grade level and the usual classroom setting.

Extraneous. Extraneous variables such as influence from media such as television, radio, or other programs, and/or advertising outside of the classroom or prior learning could not be controlled.

Setting, Population, and Sample

The school system in Tuscaloosa County was the setting for this project. Tuscaloosa County, located in West Alabama, is made up of all economic classes and many races, although the Black and Caucasian races are dominant. The major economic group is the middle class. The population

considered for this study was all sixth grade students in the Tuscaloosa County school system. The accessible population for this study was one sixth grade class from four elementary schools in the county. A convenience sample of 55 sixth grade students ages 11, 12, and 13 was selected from four schools in Tuscaloosa County.

Methods of Data Collection

Techniques/Instrumentation. The instrumentation used for this study was a quiz entitled "Here's Looking At You, Kid" (see Appendix A). The quiz was taken from the American Heart Association Schoolsite Program's "Food, Fun and Fitness Module" which is public domain. The quiz has 15 true and false questions about body composition and eating and exercising for a healthy body. The quiz was reviewed by a panel of experts; therefore, face validity was established. A lecture, video, and handouts were utilized for instruction. The video was nine minutes in length, and the lecture was approximately thirty minutes. The handouts discussed body composition, a balanced diet, aerobic and anaerobic exercise, and the importance of a healthy heart.

Procedures. Rights of human subjects were protected in the conduction of the study. Approval for the study was granted by the Mississippi University for Women, Committee on Use of Human Subjects in Experimentation (see Appendix B) before formal contact was made with the Tuscaloosa County Board of Education, schools, or children in those schools.

Written consent was obtained from the Tuscaloosa County Board of Education (see Appendix C). Verbal consent was then obtained from the principals and teachers after the study was explained to them. The parental consent forms were then given to the children (see Appendix D). The children took the forms to their parents and only were allowed to participate in the study if parental consent was granted. Permission slips had to be signed by both parent and child and returned to the researcher prior to implementation of the study.

Data collection occurred during a five week period in the Spring of 1995. Pretests were given by the researcher to each of the four selected classes separately and the teaching module was then implemented. One month later, the pretests were repeated as posttests to check for retention of knowledge. No criticism was given to or intended for children who were overweight or preferred quiet activities to other more rigorous types of exercise.

Methods of Data Analysis

The dependent *t* test was used for data analysis to compare the difference between pretest and posttest scores. The *t* test is a parametric statistical test that is used for analyzing the difference between two means (Polit & Hungler, 1991). The dependent *t* test is being utilized for the current study because a single group, the students, is yielding pretreatment and posttreatment scores. There was a

comparison of each test question as well as a comparison between the total scores.

Limitations

The major limitation in the design of this study was failure to randomly select subjects, and failure to use a control group. The four schools used in this study were located several miles from each other. Background differences may exist between the groups. Another possible limitation for consideration was "testing" effects. This would be due to using the pretest instrument in exactly the same format for posttesting. The scores could be higher on the posttest in this instance, not from increased knowledge, but would result from having "learned" or "memorized" the test (Polit & Hungler, 1991, pp. 160-161). This effect was minimized by giving the posttest one month after the pretest. Lack of time was another basic limitation since the study had to be completed prior to the end of the subjects' Spring semester and before they went on Summer break.

Summary

The purpose of this study was to compare children's knowledge levels about CV fitness and nutrition before and after a teaching module. Students ages 11-13 in the sixth grade from four elementary schools in Tuscaloosa County made up the convenience sample. A quiz from the American Heart Association was used as the pretest and posttest. The

pretest was given and then a teaching module including a video, lecture and handouts was implemented. The pretest was then given as a post-test one month later. The dependent *t* test to compare the difference between pretest and posttest scores was used for data analysis.

Chapter IV

The Findings

A quasi-experimental design was used in this study to determine if there was a difference in pre and posttest knowledge levels about cardiovascular (CV) fitness and nutrition for children after completing a teaching module. A description of the sample followed by the results of data analysis related to a research hypothesis are described in this chapter.

Description of Sample

The sample consisted of 55 sixth-grade students who resided in Tuscaloosa County, located in West Alabama. The age of the respondents ranged from 11 to 13 years. This convenience sample consisting of students selected from four elementary schools was made of 52 Caucasian and three Black students.

Analysis of Data

The hypothesis tested by this research is as follows:

H_o: There will be no difference in knowledge levels about cardiovascular fitness and nutrition for children before and after completing a teaching module.

Data were analyzed using a two-tailed dependent *t* test. The group mean score on the pretest was 9.96 with a group mean score on the posttest being 11.22. There was a statistically significant increase in knowledge levels between the pretest and posttest (see Table 1). This increase was found to be $t(54) = -4.76$, $p = .000$. Therefore, the null hypothesis was rejected. Additionally, there were several individual items on the pre and posttest that were statistically significantly different (see Table 1). There was a significant increase in item four, "Most of your calories should come from carbohydrates". On the pretest 35% of the students answered question four correctly and 67% answered correctly on the posttest, $t(54) = -3.70$, $p = .000$. There was also a significant increase in item five, "French fries are a source of fat and usually salt". Eighty-nine percent answered correctly on the pretest and 100% answered correctly on the posttest, $t(54) = -2.57$, $p = .013$. Item six, "We can control our body type" significantly differed from 50% on the pretest to 73% on the posttest, $t(54) = -2.57$, $p = .013$. Item eight, "Some examples of carbohydrates are rice, potatoes, fruits and beans" was also significant going from 67% answering correctly to 84% answering correctly, $t(54) = -2.42$, $p = .019$. There was a significant decrease in item nine, "The best exercises to make your body flexible and strong are aerobic exercises". Twenty-seven

Table 1

A Comparison of Knowledge Levels on the Kid Quiz by Group (N = 55)

	Pretest		Posttest				
Item	M	SD	M	SD	t	p	
1	.75	.440	.84	.373	-1.53	.133	
2	.64	.485	.76	.429	-1.85	.070	
3	.85	.356	.80	.404	.83	.410	
4	.35	.480	.67	.474	-3.79	.000	***
5	.89	.315	1.0	.000	-2.57	.013	*
6	.51	.505	.73	.449	-2.57	.013	*
7	.78	.417	.85	.356	-1.07	.289	
8	.67	.474	.84	.373	-2.42	.019	*
9	.27	.449	.11	.317	2.42	.019	*
10	.49	.505	.58	.498	-1.04	.301	
11	.87	.336	.95	.229	-1.43	.159	
12	.85	.356	.84	.373	.28	.784	
13	.55	.503	.62	.490	- .85	.399	
14	.75	.440	.87	.336	-1.99	.051	
15	.75	.440	.76	.429	- .30	.766	

* $p < .05$
** $p < .01$
*** $p < .001$

Note. All tests, $df = 54$

percent answered correctly on the pretest and 11% answered correctly on the posttest, $t(54) = 2.42$, $p = .019$.

Summary

The sample as well as the data collection and analysis for this study have been presented. Statistical findings revealed that there was a significant increase in knowledge between group pretest and group posttest. In Chapter V, outcomes of the findings will be presented, including discussion, conclusions, implications, and recommendations.

Chapter V

The Outcomes

Although mortality rates from cardiovascular disease (CVD) have been reduced during the past decade, heart disease constitutes a major health problem and remains the leading cause of death in the United States. Certain lifestyle behaviors or habits such as overeating and lack of exercise contribute to a person's coronary risk. Behavioral interventions should begin early in life, prior to the development of poor health habits. Teaching strategies that are effective in seeking to promote health and well-being in children need to be developed and empirically evaluated. Therefore, the purpose of this study was to determine if there was a difference in pre and posttest knowledge levels about cardiovascular fitness and nutrition for children after completing a teaching module. Nola J. Pender's Health Promotion Model was used to guide this quasi-experimental study.

Summary of Findings

The sample consisted of 55 sixth-grade students from four elementary schools in Tuscaloosa County, which is located in West Alabama. The age of the students ranged from

11 to 13 years. Of these 55 students, 52 were Caucasian and three were Black.

Data were analyzed using a two-tailed dependent *t* test. Group knowledge scores increased from a mean of 9.96 correct answers on the pretest to a mean of 11.22 correct answers on the posttest. Therefore, there was a statistically significant increase in knowledge levels between pretest and posttest. This increase was found to be $t(54) = -4.76$, $p = .000$.

Discussion

The findings from this study indicated that sixth grade students (experimental subjects) who were presented an educational program about CV fitness and nutrition experienced a significant increase in knowledge levels. These findings may indicate that sixth grade students are at an ideal age for instruction regarding CV fitness and nutrition. Additionally, the students may have viewed the teaching module that utilized videos as a welcome diversion to classroom activities. They may have been more attentive to the information presented in this format. This deduction was supported by a comparison study by Bartfay and Bartfay (1994) which showed a statistically significant increase between pretest and posttest scores after implementation of a board game. The board game conveyed information to sixth grade children related to basic anatomy and physiology of

the human body, diet and nutrition, as well as lifestyle factors associated with heart disease and cancer.

The findings of the present study in which sixth grade children initially knew little about nutrition related to CVD was supported by a study conducted by White and Klimis-Tavantzis (1992) which addressed adolescents enrolled in health classes in central Maine. The research was initiated to help the adolescents lower their risk for CVD. Participating adolescents assessed their risk for CVD which included food intake, fasting blood lipids, heights, weights, percent body fat, and cardiovascular nutrition knowledge. Assessments were made prior to and following intervention, as well as during periodic follow-ups. Total scores for both males and females were low on the Cardiovascular Nutrition Knowledge Test. White and Klimis-Tavantzis (1992) concluded that adolescents knew little about the process of CVD and issues involving fat intake and heart disease. White and Klimis-Tavantzis (1992) also recommended that emphasis on the importance of appropriate educational curricula offered within the school system from kindergarten through 12th grade be stressed.

Recommendations from a study performed by Howard et al. (1991) lend support to the implications from the current study. This descriptive study was conducted by Howard et al. (1991) to identify differences in children's physical measurements with regard to six CV factors. Three

questionnaires and physical measurements were used. The questionnaires included the Bloomsday Cardiovascular Fitness Questionnaire, the Coronary Risk Profile, and the Diet Habit Survey. Physical measurements included blood pressure readings, weight, total serum cholesterol, and high-density lipoprotein levels. Howard et al. (1991) concluded that multiple factors need to be considered when assessing children for CV risk factors. The authors recommended that the child and family, as well as the educational system, need to be involved in interventions directed toward risk reduction. These findings are similar to the current study which also recommends ways to incorporate teaching and risk reduction in an elementary school.

In the current study there was an overall statistically significant increase in knowledge levels; however, there was not a statistically significant increase in each item on the "Kids' Quiz". This could be a result of the researcher's inexperience in teaching children or the time limit of 45 minutes for instruction. Most items did, however, show a slight increase. Two items addressed calories and carbohydrates. In item four, "Most of your calories should come from carbohydrates", 35% answered correctly on the pretest and 67% answered correctly on the posttest, $t(54) = -3.79$, $p = .000$. Item eight, "Some examples of carbohydrates are rice, potatoes, fruits and beans", was also significant. Sixty-seven percent answered correctly on the pretest and

84% answered correctly on the posttest, $t(54) = -2.42$, $p = .019$. Calories and carbohydrates were both clearly defined in the teaching module and this question was answered in the video. The investigator concluded that these were the reasons for the increase. Item five "French fries are a source of fat and usually salt", also had a significant increase. Eighty-nine percent answered correctly on the pretest and 100% answered correctly on the posttest, $t(54) = -2.57$, $p = .013$. Types of fats and foods high in fat were discussed in the teaching module. Children may have remembered this information since they commonly eat french fries and are familiar with this type of food as a source of fat and salt. Item six "We can control our body type", was statistically significant with 50% answering correctly on the pretest and 73% answering correctly on the posttest, $t(54) = -2.57$, $p = .013$. This topic was discussed in detail on the video and in the teaching module. The investigator stressed the importance of this concept to the children, and explained that although our body type cannot be controlled, the body can be improved with exercise and good nutrition. Preadolescents tend to be concerned with body image, and this information may have made a lasting impression. There was actually a statistically significant decrease in knowledge levels on item nine, "The best exercises to make your body flexible and strong are aerobic exercises". Twenty seven percent answered correctly on the pretest and 11%

answered correctly on the posttest, $t(54) = 2.42$, $p = .019$. This decrease may indicate the students confusion regarding the definitions of these two terms. The investigator concluded that these terms may be too advanced for sixth graders.

Nola J. Pender's Health Promotion Model (HPM) provided a valid framework that was useful to this study. The HPM extends the Health Belief Model to include determinants of health-promoting behavior. Fleury (1992) found that the HPM had been used to explain and predict patterns of health promoting lifestyle activities including exercise and nutrition. The HPM was designed to help understand how clients can be motivated to attain personal health (Mariner-Tomey, 1994). This is important in dealing with children because children must also be motivated.

Conclusions

This researcher determined that a teaching module about CV fitness and nutrition did improve levels of knowledge of sixth graders who participated in this study. Based on the findings of this study the researcher concluded that sixth graders are at an ideal age to learn and understand more about CV fitness and nutrition.

Implications for Nursing

A number of implications for nursing were derived from this study. Much research has focused on the study of CV

risk factors for adults. However, less attention has been given to the study of these same risks in children. Few research studies have been done to evaluate the effects of a teaching program about CV fitness, nutrition, and other health promoting behaviors on children. Therefore, more research effort is needed to gain a greater insight into the effects of educational programs for children. This study could be replicated or expanded to validate research findings which would add to the knowledge base of nursing.

The results of this study may make the nurse practitioner more aware of the significant role that CVD plays in this country today. CVD is the leading cause of death in the United States. Acknowledged CV risk factors for adults such as obesity, positive family history, high serum cholesterol levels, high saturated fat intake, and sedentary lifestyle have been documented in some groups of children. Research supports that identification of CV risks during childhood may help to predict CV disease in adults (Carlisle et al., 1993). Nurse practitioners should incorporate assessment of CV risk factors in the primary health care of young children and their families.

Health promotion and disease prevention are two very important aspects of nursing. The nurse practitioner must find new and creative ways to implement these concepts. The nurse practitioner is in the perfect position to help facilitate health education for children. This study

provides the nurse practitioner with a method to facilitate education and better promote CV health in children. A way to incorporate education would be to provide videos in the nurse practitioner's waiting room. These videos concerning CVD could be played at various times during the day. Pamphlets and brochures could also be left in waiting rooms and exam rooms. This researcher believes additionally that instruction should be incorporated throughout the school year and not limited to one 45 minute session. School nurses could schedule periodic CVD teaching sessions throughout the school year. A one hour class dealing with some aspect of CVD, such as prevention and risk factors, could be offered to students at least once a month.

Basic nursing curriculum should include identification of CV risks in children, and strategies to reduce these risks. The graduate nurse practitioner programs also should address and reinforce the importance of early education concerning CVD. Nurse practitioners should be made aware of their role concerning education, screening, and follow-up.

Recommendations

Based on the findings of this study, the following recommendations are made for future research in nursing.

1. Replication of this study over a larger geographic area with a larger sample to determine the effectiveness of the program.

2. Replication of this study with different age groups of children and adolescents to determine the effectiveness of this intervention with different populations.
3. Implementation of a study conducted to compare the lecture method of instruction with gaming as a method of instruction.
4. Conduction of more research using Pender's HPM as a framework for examining the effects of a teaching module on levels of knowledge concerning CV fitness and nutrition in children.

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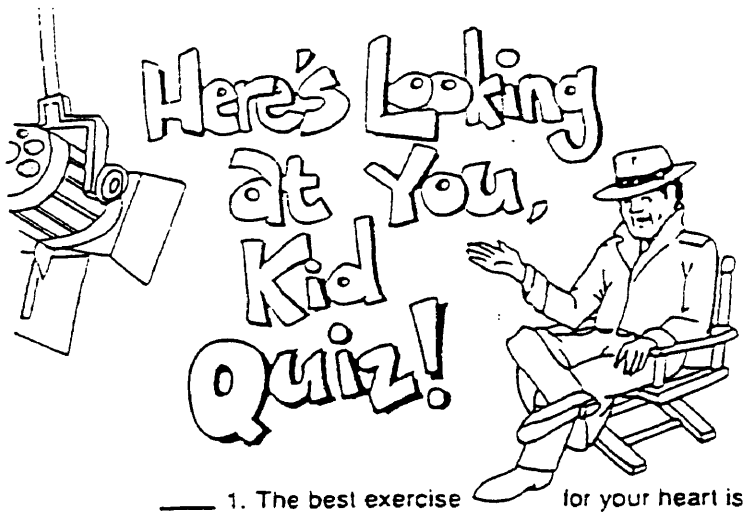
Appendixes

Appendix A

"Here's Looking at You, Kid" Quiz



Name _____

Date _____

How well did you learn about body composition and eating and exercising for a healthy body? Answer the following questions, then score yourself and find out how you rate in making heart-healthy decisions.

___ 1. The best exercise for your heart is aerobic exercise.

___ 2. For good health, a person needs to exercise every day of the week.

___ 3. What you eat and how much you exercise determines how much fat you have in your body.

___ 4. Most of your calories should come from carbohydrates.

___ 5. French fries are a source of fat and usually salt.

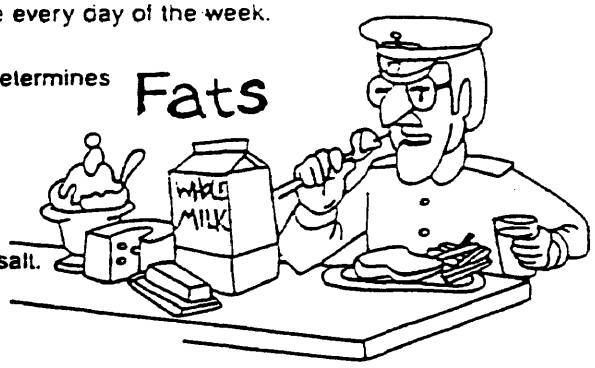
___ 6. We can control our body type.

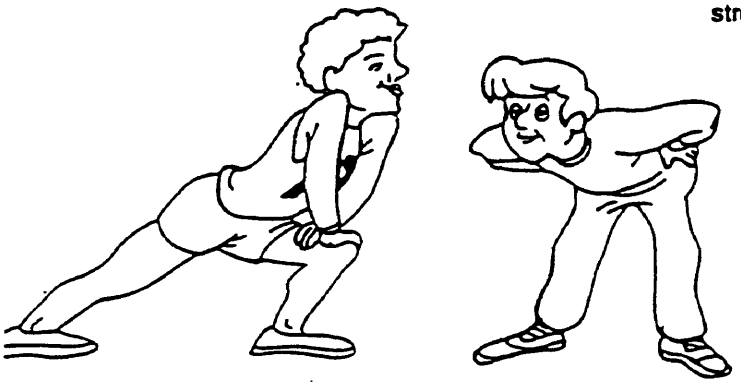
___ 7. We can control our body composition by diet and exercise.

___ 8. Some examples of carbohydrates are rice, potatoes, fruits and beans.

___ 9. The best exercises to make your body flexible and strong are aerobic exercises.

___ 10. Time-release energy is found in complex carbohydrates.



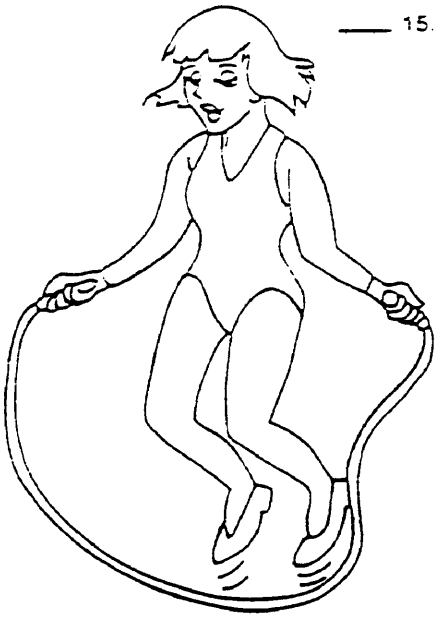


____ 11. Most American teenagers do not get enough exercise

____ 12. People who exercise are usually healthier than those who don't exercise

____ 13. A person becomes obese only by eating foods that contain a lot of fat

____ 14. It is harmful to a person's health to follow a diet that eliminates some of the food groups



____ 15. The amount of protein a person eats should make up about 15 percent of his or her total calories.

Appendix B

Letter of Approval from Mississippi University for Women on Use of Human Subjects in Experimentation

MISSISSIPPI UNIVERSITY FOR WOMEN
Columbus, MS 39701

Vice President for Academic Affairs
P.O. Box W-1603
(601) 329-7142

February 22, 1995

Ms. Susanne Isbell
c/o Graduate Nursing Program
Campus

Dear Ms. Isbell:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research with the requirement that you obtain consent from both parent and child.

I wish you much success in your research.

Sincerely,

Thomas C. Richardson
Vice President
for Academic Affairs

TR:wr

cc: Mr. Jim Davidson
Dr. Mary Pat Curtis
Dr. Rent

Appendix C

Letter of Written Consent from Tuscaloosa County Board of Education

12603 Shelly Hughes Road
Buhl, AL 35446
March 16, 1995

Dr. Marsha Burke
Tuscaloosa County Board of Education
PO Box 2568
Tuscaloosa, AL 35403

Dear Dr. Burke:

I am a Registered Nurse attending graduate school at Mississippi University for Women in Columbus, Mississippi. I spoke with you a couple of months ago about my thesis. For my research I would like to conduct a study about cardiovascular fitness and nutrition. The title of the study is "A Comparison of Children's Knowledge Levels About Cardiovascular Fitness and Nutrition Before and After a Teaching module". The proposed population to be studied is sixth graders, ages 11-13. I would like to conduct this study in four elementary schools in Tuscaloosa County, including Huntington Place, Vestavia, Buhl, and Cottondale. A teaching module which includes a video and several handouts and a quiz written by the American Heart Association will be utilized. The quiz will be given before the teaching module is implemented and then again one month after implementation. A letter of informed consent will be sent home to parents one week prior to implementation. The participants names will not appear on any information used for this study and only group scores will be reported.

I believe this study will benefit the children by teaching them more about cardiovascular fitness and nutrition and promoting healthier lifestyles. I would greatly appreciate your permission to conduct this study. This project was approved by the Committee on Human Subjects in Experimentation at MUW last week. I was not allowed to formally contact you until I gained their permission. If possible I would like to begin the first week of April. This will give me time to complete the post test before school is out. If you have any questions please contact me at 205-339-7165. If permission is granted please sign below and return this to me.

Marsha Burke

Sincerely,

Susanne Isbell RN

Susanne Isbell RN

Appendix D

Letter of Parental Consent Form

Dear Parent,

Because you have a child in the sixth grade, you are invited to allow your child to participate in a study intended to determine if a teaching module has an effect on your child's level of knowledge about cardiovascular fitness and nutrition. This study is being conducted by a Registered Nurse in Graduate School at the Mississippi University for Women. This study will benefit your child by allowing participation in a cardiovascular fitness and nutrition program.

If you decide to allow your child to take part in this study, your child will be asked to take a quiz before the teaching module is implemented and a quiz one month after implementation of the teaching module. The teaching module was written by The American Heart Association. It includes a video and several handouts concerning facts about cardiovascular fitness and nutrition.

Your decision to allow your child to take part or not to take part in this study will in no way influence your child's academic performance in school. Your child may withdraw from the program at any time. Your child's name will not appear on any information used for this study and only group scores will be reported. By signing below, you are granting permission for your child to participate in this study, please sign this form and return it to school this week.

If you have any questions about the study or would be interested in a copy of the results, please feel free to contact Susanne Isbell RN at 205-339-7165.

_____

Signature of Parent

_____

Signature of Child

_____

Date